

IN RE) Affidavit of Dr. Waney Squier
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) Re: **ISIS VAS**
ERNEST LOPEZ) **D.O.B. 26.04.2000,**
) **D.O.D. 29.10.2000**

Background

- ## Review of Materials

3. I have reviewed materials provided to me by counsel relating to the death of Isis Vas, age 6 months. These materials include a 5 page autopsy report, pediatric records, hospital records (incomplete and partly illegible), a statement of facts, a medical

chronology, and the testimony of Dr. Eric Levy and Dr. Joni McClain.

4. I was asked to provide an independent opinion on the extent of the child's brain injuries as well as, if possible, the cause and likely timing of any such injuries and their relationship to the child's death.
5. After reviewing the materials, my conclusion is that it is not possible to determine the cause of death based on the materials provided. While the child's symptoms are consistent with a head injury occurring several days prior to hospital admission, the autopsy report does not give sufficient information to determine whether this is indeed the cause of death. The materials provided further suggest the presence of natural disease. The caretaker reports indicate that the child was ill and most likely suffering from dehydration and melena (black stool, which may be caused by disorders of blood clotting) for several days prior to hospital admission. Laboratory tests taken shortly after hospital admission indicate a serious clotting disorder and other abnormalities including raised sodium and glucose levels in the blood, which suggest clinical dehydration and possibly liver failure. These aspects are better examined by a paediatrician or clinical biochemist. The bleeding around the brain noted at autopsy may therefore not be due to trauma at all, but secondary to other disease processes or, given the clotting disorder, may have resulted from post-admission hospital procedures.
6. In determining the cause of death, it is standard practice to review the residual brain tissue, the blocks and slides prepared from it and from the dura and spinal cord, the autopsy photographs and reports, the neuropathology reports, and the brain scan and radiology reports from the hospital. It is my understanding that these materials are not presently available to Mr. Lopez or his counsel. I am willing to conduct a further review when these materials become available.

Pediatric history

7. Isis Vas is the third child of Dr. Veronica Vas, who has two older children, Alex and Emily. Isis was born on 26th April, 2000. During Isis' life, Dr. Vas was a single working mother who required help with child care.

8. Isis' pediatric records indicate the following:
- May 2nd -- age 7 days, 7% below birth weight, some safety concerns
 - May 9th -- age 13 days, modest weight gain
 - May 26th -- 1 month checkup, small on growth curve
 - May 31st -- age 4 weeks, sick visit, no abnormality described
 - June 14th -- age 7 weeks, fever, thrush, candida diaper rash
 - Oct. 12th -- age 5 ½ months, missed 4 mo. checkup, behind on immunizations; weight & height below 5th percentile, impression of no set feeding schedule, recommended increased feed; diaper rash. No other problems noted.
9. Isis' birth records were not provided. These records should be reviewed prior to reaching any definitive conclusions on the cause of death.

History leading to admission

(as taken from document labeled "summary of facts" and Lopez statement)

10. Caretaker history provides the following information:
- Oct. 25th -- Isis had marks on forehead. Bruises? Insect bites?
 - Bowel movement green and black
 - Sleepy, lethargic
 - No wet diapers
 - 3 am - 6 am, Isis feverish, crying, breathing difficulties,
 - Bruises observed on body
 - Oct. 26th -- Isis stiffened and cried when diaper changed
 - Lethargic, sleepy
 - Oct. 27th -- Isis not feeding (4-6 oz. fluid intake in 2 ½ days)
 - dark black stool
 - no wet diapers
 - rolled off couch in night
 - antibiotics and "breathing treatments"
 - Oct. 28th -- refused feed, gagged and choked
 - took juice with Tylenol

- treatment"
- antibiotics, decongestant, "breathing
 - blood on diaper
 - Isis found limp and unresponsive
 - 911 call

Hospital records

11. A hospital diagram of the child's injuries show multiple brown bruises on the child's face and body on admission.
12. The child was rehydrated, given antibiotics, and blood transfusions.
13. The child's lab reports show many abnormalities. Blood tests taken approximately 30 minutes after admission show an elevated white blood cell count (suggesting infection), low fibrinogen (suggesting possible liver dysfunction and coagulation defect) and high osmolality, sodium and glucose (suggesting dehydration). A blood test taken approximately one hour after hospital admission shows deranged blood clotting and in particular a very prolonged prothrombin time, which may be secondary to severe illness and may contribute to bruising and melena. This was notified to Dr. Levy at the time. The lab results need to be assessed by an expert such as a paediatrician or clinical biochemist. The baby died 23 hours after admission.
14. The hospital records do not contain radiology reports or clinical notes of the results of the CT scan taken at the hospital.

Autopsy Report

5.3.2001, signed out by Dr. McClain and seven others
Southwest Institute of Forensic Sciences

15. The autopsy report notes multiple bruises and ecchymoses to the head, bruises to the left lateral chest, anterior hip, back and legs, and laceration and bruising of the genitalia and anus.
16. The internal examination adds no further information, but histology shows broncho-pneumonia, atelectasis and congestion of the lungs.
17. There is recent bilateral retinal and peri-optic nerve haemorrhage.

18. The fontanel was tense. The cranial sutures were separated due to cerebral oedema (swelling).
19. There is a thin (0.2 cm) right sided subdural haemorrhage. There is focal subarachnoid blood. The dura, sinuses and cortical vessels are not described. Histology shows fresh haemorrhage within and at the under surface of the dura. There is global preterminal hypoxic ischemic injury (HII) in the brain, i.e., injury due to lack of oxygen and/or blood supply.
20. There is fresh intraventricular haemorrhage in association with the choroid plexus.
21. The spinal cord is normal. There is no description of the soft tissues of the neck or the bony spine.
22. There is no record that brain sections were stained with special techniques to look for axonal injury or to attempt to determine the timing of the brain injury.

Trial Testimony of Dr. Levy

23. Isis was admitted to hospital on Saturday, October 28, 2000, in cardiac arrest.
24. She had multiple bruises and retinal haemorrhages. A CT Scan was said to show blood and evidence of traumatic injury. A diagnosis of Shaken Baby Syndrome was made.
25. Dr. Levy described blunt force injury to the head as the cause of death. He then describes mechanisms of shaking a baby. Dr. Levy believes there were fresh and older bruises and a healing fracture of the clavicle.
26. Dr. Levy stated that Isis had head trauma caused by an extremely violent force, approximating the force encountered in a fatal motor vehicle crash or fall from a second story window. Dr. Levy further stated that, given its severity, the head injury must have occurred within an hour prior to the 911 call.

Trial Testimony of Dr. McClain

27. Dr. McClain testified to the autopsy findings, including a relatively large abrasion on the back of the head. Since this abrasion is not noted in the hospital diagram, it presumably occurred after hospital admission.
28. Dr. McClain testified that there was a subdural haemorrhage of the brain caused by a tearing of the bridging veins connecting the dura to the brain. She also described a subarachnoid hemorrhage, a subscalp hemorrhage, recent retinal hemorrhage, hemorrhage around the optic nerve, and hypoxic-ischaemic damage to the brain, i.e., damage caused by lack of oxygen or blood supply.
29. Dr. McClain stated that since the bruises contained fresh intact red blood cells, they occurred within a day (24 hours, give or take a few hours) of death.
30. Dr. McClain testified that the autopsy findings were consistent with shaking and impact. After describing the child's bruises and abrasion, Dr. McClain concluded that Isis died as a result of multiple blunt force injuries, and that the manner of death was homicide.

Comments on brain pathology

31. Subdural haemorrhage, retinal haemorrhage and brain swelling are together often referred to as a "triad" of injuries associated with shaken baby syndrome. These signs are not specific and may also have other nontraumatic causes, including infections (such as meningitis), dehydration, hypoxia/ischaemia (lack of oxygen or blood supply to the brain). Given this range of possible causes, the Court of Appeal in London concluded in July 2005 that *"Whilst (the triad is) a strong pointer to NAHI (non-accidental head injury), on its own we do not think it possible to find that it must automatically and necessarily lead to a diagnosis of NAHI. All the circumstances, including the clinical picture, must be taken into account."* Thus the triad is not diagnostic of shaken baby syndrome. From a medical perspective, a diagnosis of abuse requires a detailed clinical, pathological and neuropathological evaluation and an exclusion of other possible causes. The presence of other physical evidence of abuse, such as fractures, bruises, burns, sometimes accompanied by a pre-existing pattern of abuse or neglect, supports the diagnosis. The Court of Appeal drew attention to

two other factors which may be taken into consideration:" *In addition, the Crown points to two further factors of circumstantial evidence, namely that the injuries are invariably inflicted by a sole carer in the absence of any witness; and that they are followed by an inadequate history, incompatible with the severity of the injuries*".

32. Subdural haemorrhage. As Drs. Levy and McClain testified, the type of subdural haemorrhage associated with trauma, whether accidental or inflicted, is thought to be caused by a shearing of the bridging veins which run between the brain surface and the dura (the fibrous membrane lining the skull). Traumatic SDH is often a thick, space-occupying and unilateral or asymmetrical mass.
33. The subdural haemorrhage described at autopsy was a thin-film haemorrhage that is described as "within and attached to the undersurface of the dura." This suggests that the bleeding may be coming from the dura itself and leaking into the subdural space.
34. Venous sinus thrombosis in infants is associated with infections, dehydration, disturbances of coagulation, metabolic disorders, nutritional deficiencies, etc. It may be associated with subdural haemorrhage. Dehydration may cause the blood in the dural veins to sludge and clot, putting pressure on the vein and causing blood to ooze into the subdural space.
35. It would be helpful to review the available material (e.g., residual brain tissue, blocks and slides) to look for evidence of venous thrombosis, and if present to assess how long it has been present.
36. There is no evidence from the autopsy report that special stains were employed to look specifically for evidence of traumatic axonal damage. The pattern and distribution of axonal injury can be helpful. One third of infants who reportedly died from non-accidental injury (including shaken baby syndrome) showed axonal injury in a localized distribution in the brainstem. Most infants showed hypoxic-ischaemic damage, i.e., damage from reduced blood or oxygen supply to the brain. Geddes, J. et al, Neuropathology of inflicted head injury in children, I. Patterns of brain damage, Brain 124, 1290-1298 (2001).

37. Biomechanical research indicates that it is not possible to create sufficient force through shaking to cause subdural or retinal haemorrhages. Ommaya, Goldsmith and Thibault, Biomechanics and neuropathology of adult and paediatric head injury, British Journal of Neurosurgery 16(3):220-242 (2002) (summarizing biomechanical research on shaken baby syndrome). Cases involving such severe forces would be expected to suffer neck injuries, which do not appear to be present in this case, suggesting that one must look elsewhere for causes of the haemorrhages noted at autopsy.
38. Retinal haemorrhage. Retinal haemorrhages have many natural as well as traumatic causes, e.g., brain swelling and increased intracranial pressure (Lantz 2006). Retinal haemorrhages are not therefore an independent indicator of trauma or abuse (Vinchon 2005).
39. Brain swelling. The autopsy report describes a swollen brain. This is entirely non-specific and may be caused by natural disease processes, such as lack of oxygen or infection. It may also occur as a result of hospital treatment, including rapid rehydration or over-hydration.
40. Possible causes of "triad". The "triad" of subdural haemorrhages, retinal haemorrhages and brain swelling may be due to a number of causes. These include: (1) impact injuries (accidental or inflicted), a diagnosis that is supported when there are other indicators of impact, such as skull fractures, bruises or traumatic injury to other parts of the body; (2) natural disease processes including clotting disorders, metabolic diseases and malformations; (3) hypoxia-ischemia (i.e., lack of oxygen or blood supply to the brain); (4) other causes, including genetic and unknown; (5) shaken baby syndrome or other theoretical forms of nonaccidental trauma, which should be considered only after the other possibilities have been excluded.
41. Impact injury. In this case the autopsy does not report contemporaneous bruises or fractures or injury to the neck. While these are not always seen in impact injury, their absence suggests that one should also look for a cause in natural disease processes.
42. Natural disease processes. The records contain evidence of several natural disease processes occurring in the days prior to

death, including infection, dehydration, a clotting disorder and severe metabolic disturbance. Since I am not a clinician, I recommend that this issue be further addressed by a forensic pathologist, paediatric haematologist and/or paediatrician.

43. Hypoxia-Ischemia. Hypoxia (Insufficient oxygen in the blood) and ischemia (insufficient blood supply) may cause brain swelling and brain cell death. Hypoxia/Ischemia (HII) is entirely non-specific and may be secondary to trauma or natural disease processes, or may be the sequel to obstructed breathing or choking. Isis' clinical history of respiratory difficulties in the days prior to hospital admission and choking on her feed in the morning prior to her arrest may be consistent with this explanation.
44. Intraventricular Haemorrhage. In addition to the small amount of bleeding in the subdural space, the autopsy report notes a subarachnoid haemorrhage and haemorrhage in the lateral ventricle. These findings are consistent with HII, and may have been exacerbated by a clotting disorder.
45. Scalp haemorrhage. Given the documented clotting disorder, bleeding at the back of the head may have resulted from the child lying on its back after hospital admission. This should be addressed by a paediatric forensic pathologist.
46. Timing of haemorrhages. Based on the information provided, I do not see any medical basis for concluding that the haemorrhages in the brain occurred prior to hospital admission or within a narrow time period prior to admission. Assessment of the timing of the brain haemorrhages requires a thorough review of the neuroradiology on admission and neuropathological review of the brain slides. Neither the trial testimony nor the autopsy report indicate that special stains were used to determine the age of the haemorrhages.
47. Review of the CT scan may help determine the timing of the bleeding observed at autopsy and/or identify whether there was any change or movement in the bleeding between the CT scan and the autopsy.

General observations

48. While I am a neuropathologist rather than a clinician, the child's clinical history, medical records and lab reports suggest that Isis suffered bruises, possibly due to impact, either accidental or abusive, prior to the day of admission. This is consistent with caretaker reports, including the mother's testimony that the facial markings were present five days before hospital admission and two days prior to arrival at the babysitters.
49. The hospital records indicate that Isis was severely ill in the days prior to hospital admission.
50. The clinical history indicates that Isis was much more ill on admission than was apparent from the trial testimony. The history immediately prior to admission is that of a sick baby with melaena (bleeding into the bowel, causing the stool to become black). The baby was lethargic and not feeding, and was given multiple medications over several days. The medical records indicate at least two natural disease processes, dehydration and a clotting disorder, each of which may cause or exacerbate bleeding in the brain and other parts of the body.
51. Dehydration. Dehydration would result from taking only 4-6 ounces of fluid from Wednesday afternoon to Saturday morning, as indicated by the clinical history. As Dr. Levy notes in his testimony, dehydration of this magnitude would be sufficient to cause death. Dehydration is associated with venous thrombosis which may lead to subdural haemorrhage.
52. Coagulation. The coagulation reports from blood taken shortly after hospital admission indicate that Isis' blood clotting was deranged and in particular that the prothrombin time was very long. This was notified to Dr. Levy at the time. An elongated prothrombin time may be secondary to severe illness and may contribute to bleeding, bruising and melaena.
53. I notice that the baby was given Tylenol and other medications, some prescribed for other children, in her last days. This may cause mucosal irritation and bleeding, particularly in the presence of a clotting disorder. This issue should be addressed by a specialist paediatric haematologist.
54. Recommendation. Given the clinical history and abnormal laboratory results, I recommend that a forensic pathologist, paediatric haematologist and/or paediatrician review the

laboratory results and medical history as a whole in an effort to determine the cause of death. Such a review should consider the possibility of natural disease processes, as well as the possibility of neglect or abuse prior to arrival at the babysitters and inappropriate medical care in the days prior to death.

Conclusion

55. The autopsy report lists the cause of death as "multiple blunt force injuries." I believe that there is evidence that the child's death may have been the result of natural disease processes, including infection, dehydration, and a clotting disorder, possibly aggravated by pre-existing neglect or abuse and inadequate medical care.
56. Given the complexities of this child's medical records and clinical history, a more specific cause of death should be sought. Brain scans and any residual brain tissue and dura should be reviewed in order to look for evidence of venous sinus or cortical vein thrombosis, which may have occurred in conjunction with dehydration. The more detailed autopsy notes, including photographs, brain slides, and neuropathology reports, should also be reviewed or reevaluated in light of the child's medical condition, history and lab results.

Waney Squier

Waney Squier
Consultant Neuropathologist

Subscribed and sworn to before me

[Signature]

Notary Public

this 8 day of August, 2006

[Signature]

STEPHEN EDWARD EWENS
NOTARY PUBLIC OXFORD

ENGLAND

HERBERT MALLON GOWERS
128 HIGH STREET
OXFORD OX1 4BS